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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,558	06/12/2006	Masayuki Tobita	1018.1232101	1707
28075 7590 08/18/2010 CROMPTON, SEAGER & TUFTE, LLC 1221 NICOLLET AVENUE SUITE 800 MINNEAPOLIS, MN 55403-2420				
EXAMINER				
FREEMAN, JOHN D				
ART UNIT		PAPER NUMBER		
1787				
MAIL DATE		DELIVERY MODE		
08/18/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/582,558

Applicant(s)

TOBITA ET AL.

Examiner

John Freeman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 6-10, 17-24 and 26-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 11-16 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-5, 11-16, and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
3. Claims 1, 5, 11, 16, and 25 recites the fiber axes are arranged "in at least two directions" along a first plane. The specification does not appear to provide support for the recitation of "in at least two directions" as claimed.

Claim Rejections - 35 USC § 103

4. Claims 1-5, 11-16, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobita (US 2003/0003287) in view of Akatsuka et al. (US 6,261,481).
5. Tobita discloses a heat conductive resin substrate having organic fibers oriented along two directions of the surface (e.g., in the X and Y directions) of the substrate [0013,16]. The substrate comprises liquid crystal polymers [0022]. The material is to be used for a printed circuit board, which have conductive layers [0027].
6. Tobita is silent with regard to liquid crystal epoxy resins, aromatic polyesters, or polyamides.
7. Akatsuka discloses a liquid crystal resin having an aromatic mesogen group (col 3 ln 50). Polymers containing the mesogen group include thermosetting epoxy resins (col 5 ln 28-32), and polyesters or polyamides (col 5 ln 24-25). Akatsuka's polymers have improved thermal conductivity (col 3 ln 4-10).

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8. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use an aromatic polyester or aromatic polyamide as taught by Akatsuka as the liquid crystal taught by Tobita to improve the thermal conductivity of the substrate.
9. Akatsuka discloses the molecular chains can be oriented via electric fields and notes the desirability of the highly oriented polymers (col 9 ln 27-42). At the time of the invention, it would have been obvious to one of ordinary skill in the art to orient the molecular chains to such a degree as to fall within the presently claimed broad range in order to improve the thermal properties of the substrate.
10. Tobita discloses the thermal conductivity of the substrate is greater along the orientation of the organic fiber [0016]. Akatsuka discloses the thermal conductivity is greater along the direction of the orientation of the molecular chains (col 9 ln 15-32).
11. At the time of the invention, it would have been obvious to one of ordinary skill in the art to orient the liquid crystalline polymers of Akatsuka perpendicularly to the orientation of the plane defined by Tobita's fibers to create a composite exhibiting improved thermal conductivity isotropy, i.e., similar thermal properties in all directions of the composite.
12. The examiner takes the position the substrate of Tobita in view of Akatsuka intrinsically meets the thermal expansion coefficient limitations presently claimed because the materials are the same as presently claimed.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Smith '376 discloses liquid crystalline polymers exhibit anisotropic CTE values in directions orthogonal to the direction of molecular orientation.
14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of

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this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Freeman whose telephone number is (571)270-3469. The examiner can normally be reached on Monday-Friday 9:00-6:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on (571)272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John Freeman
Examiner
Art Unit 1787

/John Freeman/
Examiner, Art Unit 1787

/Callie E. Shosho/
Supervisory Patent Examiner, Art Unit 1787